AR30-05.239
1988.11.22

COMPACT
disc
DIGITAL AUDIO

TESTDISCS

PFE
PILOT FACTORY
CONSUMER ELECTRONICS

Contents

AR30-05.239
1988.01.14

"Compact Disc Test discs"

1. Introduction

This catalogue gives titles and other information about CD-testdiscs. The fields of application of these testdiscs are during the development and during the production of CD-sets and/or sets with a built-in CD-player, and these testdiscs are also applicable for evaluation of a complete CD mechanism.

During the development the main purposes of the use of testdiscs are to verify the playability of the CD-player and to verify whether or not the CD-player is in accordance with the Philips and the applicable international CD Standards, as laid down in the IEC standard (Draft UAR 1513 - 138/8303) and "The red booklet", handed out to CD licences. The IEC standard is based upon "The red booklet".

2. Field of application

The test method is given per testdisc. E.g. measuring erco-flags, listening, check starting of the set.
Mostly two measuring methods have to be used, these methods are:

A. The listening method

Especially for test in the production, it is checked whether defects are audible or not.

B. The measuring of error correction flags

The number of erco flags has been proven to be a valuable quality indicator for the total player. Therefore this test must be done on a random sample, on a regular basis, out of the production sets.

In the complete CD player, or combination in which a CD system is built-in, there are several subsystems to be distinguished. These subsystems are:

1. The optics, rafoc unit, turntable unit.
2. The servo electronics.
3. The demodulation and error correction system.
4. The microprocessor control system.

Each of these systems has to be investigated by use of testdiscs in the design stage and during the production.
If some of the subsystems have been tested in the design stage, it is not necessary to verify these items again in the production stage.
However it is recommended that at least all items are again tested on several sets if technical changes on the CD system are introduced during production.

In the next survey, examples are given on which items during which phase the CD player can be verified:

	Design phase	Production stage
Optics/Rafoc/Turntable	X	0
Servo electronics	X	0
Demod. and error corr.	X	0
Microproc.	X	0
Playability tests	X	*

X) Has to be measured and checked as part of the design and production release procedure.

0) Recommended to be measured on a random sample out of the production at regular intervals; and always in case of a change proposal to verify whether or not this approval is correct.

*) Measurement must be part of the production process and carried out on each produced set.

3. Testdisc handling

It is evident that testdiscs must be handled with care to avoid failures of tests or measurements.

Some relevant recommendations are:

3.1 Never write on the disc, neither on the label side, nor on the read-out side; do not apply adhesive labels.

3.2 It is recommended to store the discs in their original packaging. Keep them away from extreme heat or moisture and avoid exposure to direct sunlight.

3.3 For optimum result it is recommended to keep the playing surface clean and free from grease, dust etc. It can be wiped (always in a straight line from centre to edge) with a clean and lint-free, soft dry cloth. No solvent or abrasive cleaner should ever be used on the disc.

3.4 Avoid scratches when using the testdiscs, by using e.g. a foam mat and or other protective measures/actions.

3.5 Check regularly the used test discs, to avoid wrong interpretations of testresults, caused by damaged testdiscs.

3.6 Keep one or more models (sets) which are representable for the sets in production as a reference model. In case of doubt about the usability of the testdiscs, these models can be used for verification.

3.7 By cleaning the disc with a soft dry cloth, disc can become statically charged. Therefore it is recommendable clean the disc with an anti-static airpistol.

4. Survey of testdiscs and testequipment

On the next pages a survey of the presently available testdiscs is given. It is expected that new testdiscs will be developed in the future, according to agreements of "playability-team". In this survey testdiscs developed by Philips are mentioned.

Survey Codenumbers

A: Normally available testdiscs.

Audio Discs	For internal use only	Also for Service and OEM
7122 784 67000: testdisc 5		x
7122 784 67010: testdisc 5A		x
7122 784 67020: prod. testdisc	x	
7122 784 67040: subchassis VI	x	
7122 784 67050: subchassis VIA	x	
7122 784 67060: skew disc 0.6°	x	
7122 784 67070: eccentricity disc (200 μ)	x	
7122 784 67080: bump disc (beule)	x	
7122 784 67090: burn-in testdisc		x
7122 784 67100: testdisc 3		x
7122 784 67110: "spaken-plaat"	x	
7122 784 67130: Audio signals disc		x
7122 784 67210: Maximum diameterdisc.	x	

B: On special request testdiscs: see next page, page 6.

N.B. Codenumber on disc on information side not relevant; these codenumbers change with new galvanos.

"Audio signals disc" and "Maximum diameterdisc" available B-period 1988.

Interfaces and testequipment
7122 784 40660: CD2A-interface
7122 780 29020: 13th-order Cauer-filter
7122 784 67150: BLER-card (CD2A-interface) only in combination with CD2A-int.face.
7122 784 67400: Radial Noise Card

(Sony interface and first generation-Phil-interface only on special request yet available).

B-discs:

- only available on special request **

or

- unique *

1. Shrink groove *
2. Air bubble *
3. Thick disc *
4. Thin disc *
5. Line structure *
6. Criss/cross scratch **
7. Scotch brite **
8. Minimum-length 4 secs. *
9. Disc with track 5,6,7 *

Ordering information:

Testdiscs, interfaces mentioned in the forgoing pages and if necessary further information can be ordered via the following address:

N.V. Philips Gloeilampenfabrieken
Pilot Factory Consumer Electronics
Production Engineering Department

Attn.: Mr Zwetsloot
Building SFH-3
5600 MD Eindhoven
The Netherlands

Telex: 35000 PHTC NL
Routing Indicator NLSEVAV

Telefax: 31-40-734770

Survey of purpose and contents of testdiscs

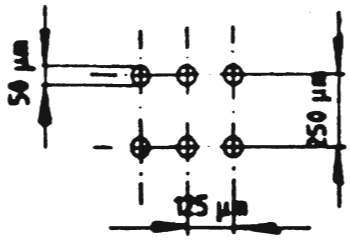
Description and ordering number	Purpose	Contents	Method: 1 Error correction measurement 2 Listening	For requirements and drawings see page	Notes
Testdisc 5 7122 784 67000	Reference disc in combination with 5A	See leaflet in disc package	2	-	Drop-out free disc used as a reference in combination with 5A testdisc
Testdisc 5A 7122 784 67010	Check drop-out sensitivity	See leaflet in disc package	1 + 2	20, 12	This testdisc is used by all external test institutes, together with "testdisc 5"
Production testdisc 7122 784 67020	Customers check and player performance in production	See pages 15, 16	1 + 2 + programming + observation	13, 21	
Subchassis VI 7122 784 67040	Customers check and player performance in production Alignment procedures	See pages 17, 18, 19 "	1 + 2 + programming + observation		
Subchassis VI A 7122 784 67050	As VI + check dropout sensitivity		1 + 2 + programming + observation	20, 14	

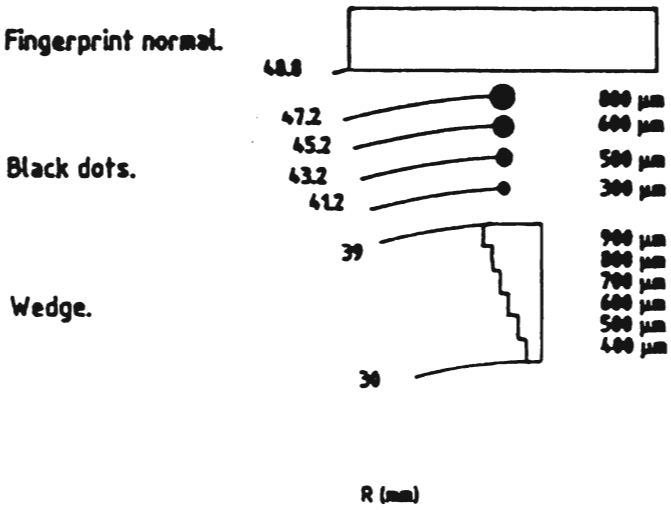
Survey CD testdiscs

Description and ordering number	Purpose	Contents	Method: 1 Error correction measurement 2 Listening	For requirements and drawings see page	Notes
Skewdisc 0.6° 7122 784 67060	Check loading + rafoc unit	- Music (as test-disc 5) - or 1 kHz as burn-in	Check starting + 1 + 2	20	
Eccentricity disc 200 micron single amplitude 7122 784 67070	Check disc drive motor Check servo systems Check loading + rafoc unit	- Music (as test-disc 5)	Check starting + 1 + 2	20	
Bump disc (Beule) 7122 784 67080	Check servo system (push-pull tracking)	Not relevant (audio)	1 + 2	20	
Burn-in test disc 7122 784 67090	- Reliability test - Burn-in test - Mechanical noise test - Shock sensitivity	1kHz at - 30 dB, ± 65 min. 20"tracks		20,21,22	Also for service and repair available (continuous 1 kHz L/R signal) (continuous 1 kHz L/R signal) signal)

Description and ordering number	Purpose	Contents	Method: 1 Error correction measurement 2 Listening	CD requirements and drawings see page	Notes
Testdisc 3 7122 784 67100	Audio performance check	See leaflet	Measurments acc. to UAN-L1059	Verification of the audio specification	The use of a "Cauer filter" (20kHz, L.P. filter) at audio line output is necessary
"Spakenplaat" ("Spokes"-disc) 7122 784 67110	Servo control development and focus adjustment (m.t.f.-check)	Radial spoke pattern 5 bands freq 250-1250 kHz steps 250 "	-	-	
Audio signals disc 7122 784 67130	Audio performance check	(when available see leaflet) see appendix	Measurements in accordance to UAN-L1059	Verification of the audio specification	The use of a "Cauer filter" (20kHz, L.P. filter) at audio line output is necessary
Maximum diameter disc (maximum read) 7122 784 67170	Check of maximum diameter reading	(t.b.f.)	1 + 2	(t.b.f.)	

Description and ordering number	Purpose	Contents	Method: 1 Error correction measurement 2 Listening	CD requirements and drawings see page	Notes
1 Shrink groove	Check optics	-	CD2A-measurement		0,05
2 Air bubble	Check servo + demod.	-	CD2A-measurement		
3 Thick disc	Check optics	-	CD2A-measurement		Thickness 1.32 mm
4 Thin disc	Check optics	-	CD2A-measurement		Thickness 1.14 mm
5 Line structure	Check optics + servo	-	CD2A-measurement		
6 Criss/cross scratch	Player check	-	CD2A-measurement		
7 Scotch brite	Player deck	-	CD2A-measurement		
8 Minimum length 4 seconds	Check micro-processor program	4 seconds music	One-time playing		
9 Disc with track 5,6,7	Check micro-processor program	Only tracks 5,6 and 7	Start and observation		





DROP OUT (µm) WEDGE	T.No.	A.B.S. min. sec.
400	5	6':59"
500	6	10':07"
600	7	12':05"
700	8	15':16"
800	8	16':47"
	T:30" 4':10"	19':27"
900	9	19':59"
BLACK DOTS		
300	11	26':55"
500	13	30':32"
600	14	34':56"
800	17	40':04"
FINGER PRINT	18/19	42':46" 45':06"

TEKENING 1.

	Test disc 5A	7122 784 6701

NAME / NAAM: Zwetsloot. | SUPERV. | B. | Nr. 110 | A4

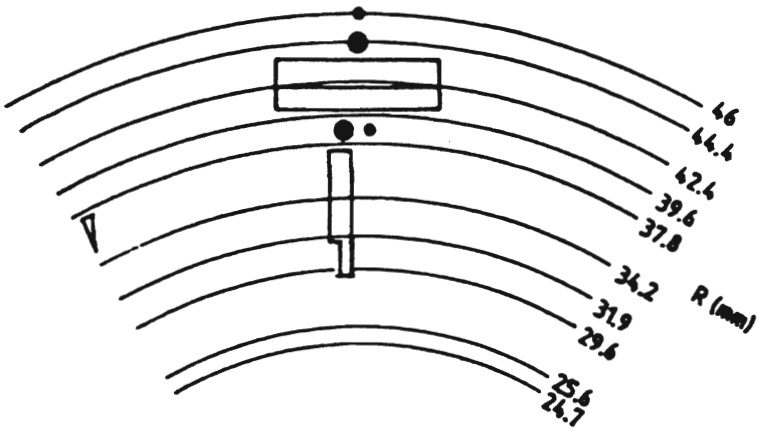
CHECK / CONTR. | DATE: 87-08-28. | N V PHILIPS GLOEILAMPENFABRIEKEN EINDHOVEN NEDERLAND

Black dot ø 300 µm
Black dot ø 600 µm

Normal fingerprint
Heavy fingerprint
Double black dot ø 600 + 300 µm
Double wedge conical 0 – 400 µm

Wedge 800 µm

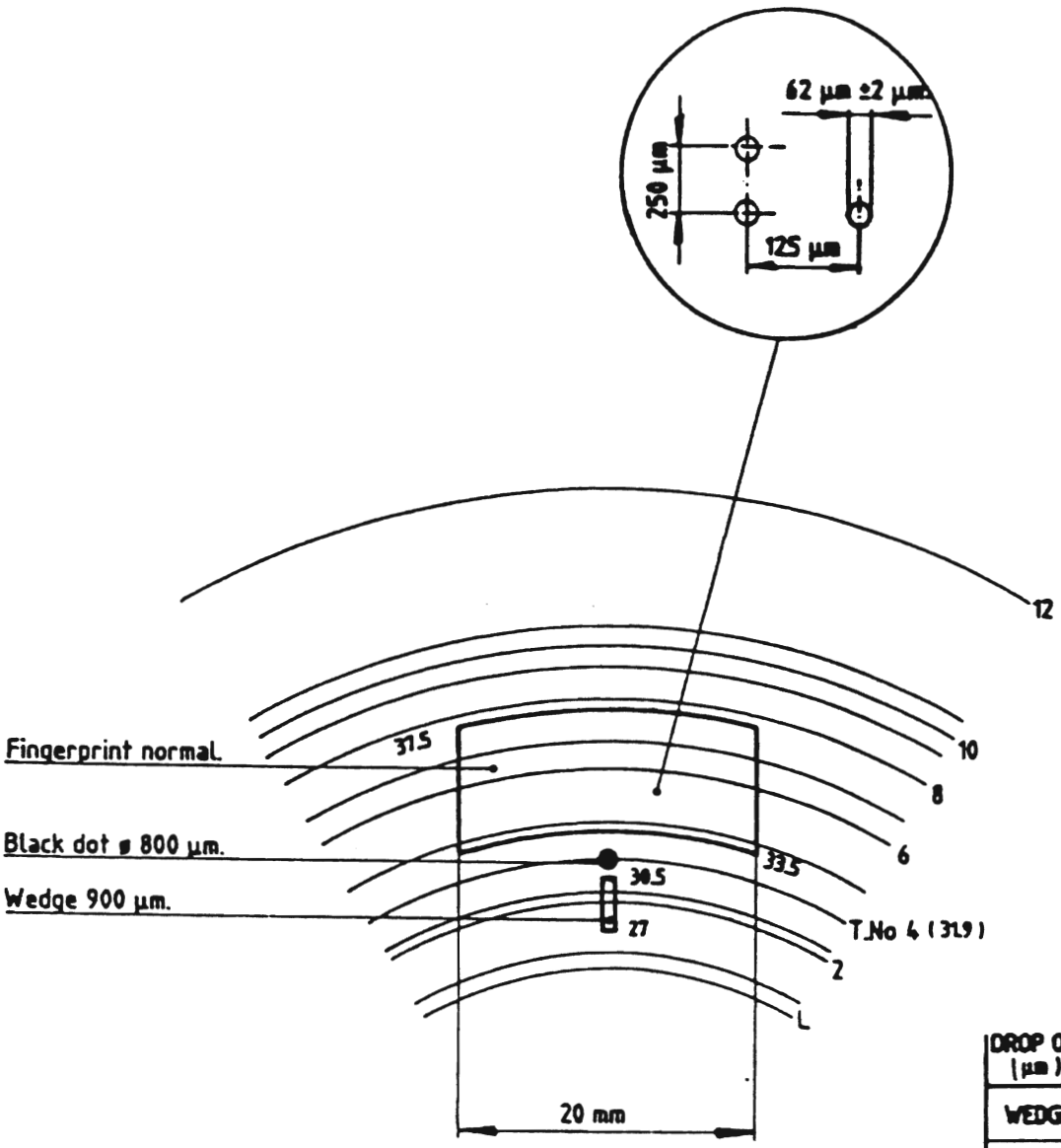
Wedge 400 µm

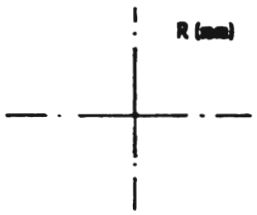


T.No.	DROP OUT (µm)	A.B.S. min. sec.
1	—	0':00"
2	—	1':10"
3	WEDGE 400	7':12"
4	WEDGE 800	11':14"
5	DOUBLE WEDGE	15':16"
6	DOUBLE BLACK D.	22':30"
7	H. FINGER PRINT	26':20"
8	N. FINGER PRINT	32':38"
9	BLACK DOT 600	37':25"
10	BLACK DOT 300	41':27"

TEKENING 3.

	Production test disc	7122 784 6702
NAME NAAM Zwetsloot	SUPERS VERI	A4
CHECK CONTR DA		N V PHILIPS GLOEILAMPENFABRIEKEN EINDHOVEN NEDERLAND





DROP OUT (µm)	T.No	A.B.S TIME
WEDGE		
900	2	3':13"
	3	8':15"
BLACK DOT		
800	4	11':14'
FINGER PRINT	4–5 6–7	13':50" 22':30"

TEKENING 2.

	Subchassis VI A	7122 784 6705
NAME / NAAM: Zwetsloot.	SUPERS. VERS.	110
CHECK CONTR. DA: 87-08-28.		A4

N V PHILIPS GLOEILAMPENFABRIEKEN EINDHOVEN NEDERLAND

CONTENTS OF THIRD GENERATION PRODUCTION TEST DISC

Linear velocity: v = 1.23 m/s
All pauses : 2 seconds, except 11 p and 12 p: 0 seconds

TNO	INDEX	CONTENT	PURPOSE
lead in		Start at diameter D=45,77 mm.	
1	1	t=0'00" start music with 0 SMPTE frames lead-time at D=49,43 mm. Music in phase.	To evaluate starting conduct of CD player.
	2	t=0'05" music out of phase.	To check phase connections of player.
	3	t=0'10" - 1'10" Music in phase.	
2	1	Left-right-left-right.	
	2	1 min. silence.	
	3	3 min. music.	

For track 3,4,8,9 and 10 the following index is valid.

Index	1:	Sine-w signal 1000Hz, -30dB t=o'00" - 0'10"	In order to measure electronically the drop-out sensitivity
	2:	Music signal	In order to listen to drop-out sensitivity.
3		Wedge 400 µm t > 4 min.	International CD spec.
4		Wedge 800 µm t > 4 min.	
5	1-99	Double wedge t > 4 min.	CD2A-measurement

6	1-15	Double black dot. 600 µm and 300 µm	CD2A-measurement
7	1	Heavy fingerprint > 4 min.	CD2A-measurement
8		Normal fingerprint > 4 min.	Philips CD spec.
9		Black dot 6oo µm > 4 min.	
10		Black dot 300 µm > 4 min.	International CD spec.
11	1	4 sec. music without pre-emphasis. Music start at t=0'00" with Q-pause between TNO 10 and 11 is 0.	Check on de-emphasis function. Check microprocessor when programming.
12	1	Music from TNO 11 continuous in TNO 12, Q-pause is 0. 3 sec. music with pre-emphasis.	
	2	3 sec. 10kHz -30dB with pre-emphasis.	Check de-emphasis with sine-w signal.
13	1	Q-pause: 2 sec. (normal). 3 sec. 10 kHz -30dB without pre-emphasis.	
	2	3 sec. 400 Hz -30dB in phase.	Phase check.
	3	3 sec. 400 Hz -30dB out of phase.	
	4	Music to fill up time.	
14	1	Music (digital recording). Apply: "Digital copy not permitted" flag.	Cannot be read (written at a large radius).
Lead out		Start lead out at D > 114.43 mm.	

Note: At TNO 3,4,6,8,9,10 and 13 music starts at 40 - 90 msec. before the pause flag (subcode p channel) changes sign.

Sub chassis VI Disc (2899 086-01)

1. Thickness: within spec.

2. Linear velocity: V = 1,24 m/s
   except tno 8 : V = 1,13 m/s

3. Trackpitch: q = 1,60 µm
   except tno 8 : q = 1,40 µm

4. Eccentricity
   disc individual
   Diameter centerhole

5. HF signal
   Push-pull
   Asymm.

T.N.O.	I_3	I_{11}	Asym. %	// push/pull
1	0,41	0,77	12,5	0,065
2	0,34	0,73	2	0,065
7	0,40	0,74	12	0,065
8	0,22	0,60	10	0,056
9	0,32	0,67	1	0,065
10	0,40	0,71	12,5	0,065
11	0,34	0,68	3	0,065
13	0,40	0,74	12	0,063
14	0,41	0,74	13	0,063

SUBCHASSIS VI TESTDISC (2899-086-01)

TIME	TNO	INDEX	MUSIC CONTENTS	NOTE	TIME IN DISPLAY
0'00	1	1	t=0'0" (with 0 SMPTE frames lead time) music out of phase	Usable for: * 1. Jitter 2. Cutting	0'00"-0'0
		2	t=0'05" music in phase	3. Stuttering	0'05"-1'1
1'14"	2	1	Left-right-left-right	* Original	0'00"-1'0
		2	1 min. silence	Dutch text:	0'06"-1'0
		3	Music	1. Jitter 2. Knippen	1'06"-6'
7'16"	3	1	t=0'00" sine-w 1kHz-30dB	3. Stotteren	0'00"-0'1
		2	t=0,10" music		0'10"-4'0
11'18"	4	1	t=0'00" sine-w kHz-30dB		0'00"-0'1
		2	t=0'10" music		0'10"-4'4
16'05"	5	1	t=0'00" sine-w 1kHz-30dB		0'00"-0'1
		2	t=0'10" music		0'10"-3'5
20'02"	6	1*	0 pause 0 SMPTE frames lead-time 5 sec. "sound" without pre-emphasis. Sound: sine-w 1 kH-30dB with pink noise (bandwidth 2-20kHz at -50dB).		0'00"-0'5
20'07"	7	1*	0 pause Sound continuous of TNO6, with pre-emphasis.		0'00"-0'1
		2*	Music		0'15"-0'5
23'04"	8	1*	Deviating recording parameters. Music		0'00"-2'4
25'54"	9	1 up to 99 of which			
		50	Assymetry 1 %		0'00"-10'
36'01"	10	1*	Last 60 msec. of track: digital silence		0-3'24" 3'20"-3'2
39'25"	11	1*	0 Pause 0 SMPTE frames lead-time.		0'00"-10'

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SUBCHASSIS VI TESTDISC (2899-086-01)

TIME	TNO	INDEX	MUSIC CONTENTS	NOTE	TIME IN DISPLAY
				Pause 9 secs.	
50'12"	12	1	Music		0'00"-12'
63'04"	13	1	t=0'00" sine-w 400 Hz in phase.		
		2	t=0'03" sine-w 400 Hz out of phase.		
		3	t=0'06" music	Music.	0'06"--3'
			* Pause	L sine-w - R music	3'38"-3'4
69'25"	14	1	5 sec. sine-w 1 kHz-30dB	L and R sine-w	3'41"-6'2
69'25"	Lead-out			69'30"	

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ABEL 1

A-MEASUREMENTS

	Requirements			Disc	Measuring Method	Remarks
	C23	C24	EFAB	6A-5A ***	CD2A measurement	Player check
A1. Drop out sensitivity 5A-6A	100	0	0			
Wedge 900 µm	100	0	0			
Black dot 800 µm	0	0	0			
Fingerprint						
A2. Eccentricity	0	0	0	200 µm ***	CD2A measurement up to = 30 mm.	Servo/demod (Fifo)
A3. Skew	0	0	0	0,6° disc ***	CD2A measurement up to = 30 mm.	Optics + servo
A4. Bump	50	0	0	Bump disc ***	CD2A measurement 45 min. to 55 min.	Player check servo, demod, optic

Remarks:

1. Some measurments can be deleted on CDM-level.
2. B measurements should have a follow-up with CD2A error flag measurements as a reference.
3. Discs: * : n = 1 (unique)
   ** : n > 4 (limited numbers)
   *** : is normal deliverable

B-MEASUREMENTS

	Requirements			Disc	Measuring Method	Remarks
	C23	C24	EFAB			
B1. Doublewedge	-	-	0	Production testdisc ***	CD2A measurement	Player check
Double black dot	-	50	0			
Heavy fingerprint	No track jump in playmode					
B2. Shrink groove	0	0	0	0,05	CD2A measurement	Optics
B3. Airbubble	50	0	0	*	CD2A measurement	Servo + demod
B4. Thick disc	0	0	0	* 1.32 mm	CD2A measurement	Optics
B5. Thin disc	0	0	0	* 1.14 mm	CD2A measurement	Optics
B6. Linestructure	-	50	0	*	CD2A measurement	Optics/servo
B7. Criss/cross scratch	-	-	0	** 425 gr.	CD2A measurement ▲	Player
B8. Scotch brite	-	-	0	**	CD2A measurement ▲	Player
B9. Bad eye pattern - small signal amplitudes - low velocity - low trackpitch	0	0	0	Sub. VI ***	CD2A measurement 7 --> 8 8 --> 9	Servo/deco. (egalisation)

▲ only relative measurement during development

	Requirements	Disc	Measuring Method	Remarks
B10. Starting up	No audible defects	Bach 410038 or prod. testdisc *** subch. VI	Start and listening	µP
B11. RMAX	No playing problems with T.N.O. 14	- prod. test-disc - sub. chas. VIA ***	Playing total T.N.O. 14	Servo/optics
B12. Burn-in testdisc		***	- Shock sensitivity - Mechanical noise (T.N.O.1 and 20)	Player check
B13. Minimum length disc 4 sec.	No start and read out problems	4 sec. music	One time playing	µP
B14. Disc with track 5,6,7	Start normally read out "5", "6" and "7" correct. Track indication on display.	Only TNO 5-6+7 **	Start and observation	µP
B15. Disc with 99 tracks (max. toc length)	Small time delay in searching TNO 99 is allowed.	Audio Signals disc.	Start and observation	Check TOC reading. Check, find TNO 99.